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The Effect of Ridge Direction on Soil Temperature for Early Potato Production

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Summary

Early potato cultivar Maris Bard, physiologically aged to 800°C days, was planted on 17 March 1986, near Shifnal, Shropshire, in a freely draining loamy sand of the Newport Series. The bulk of the field was ridged in an East/West direction but the headlands were ridged North/South. The field has a slight Northerly aspect with a slope of 1-2°.

Tuber temperatures during growth and soil temperatures at the tuber depth showed minor differences between the two ridge aspects which did not visibly affect the rate of emergence or maturity of the crop when harvested on 2/3 July.

Method

Shortly after planting thermistors, connected to a Grants data logger, were inserted in the tubers and soil. The planting depth of the tubers under study was 18 cm and the temperatures were recorded every 20 minutes. Air temperatures were similarly recorded in a saucer screen adjacent to the field.

Prior to installation, the calibration of the probes indicated that all channels were accurate to $\pm$ 0.1°C, but as the sensors were destroyed during harvest the calibration could not be repeated at the end of the study.

Results

The weekly averaged maximum, minimum and mean ridge temperatures are given in Table 1. The differences between the soil and tuber temperatures are small (<0.2°c) and probably instrumental, so the average of the two is given for each ridge orientation.

Table 1. Weekly Temperature Averages °C.

	North/South Ridge			East/West Ridge			Ambient Air
	Tx	Tn	Tm	Tx	Tn	Tm	Tm
W/e.							
28/3	7.5	4.1	5.8	7.7	4.1	6.0	6.4
4/4	8.1	3.3	5.3	8.2	3.4	5.5	4.3
11/4	5.6	2.7	4.2	6.2	2.3	4.3	3.5
18/4	8.1	4.5	6.3	8.6	4.4	6.5	5.6
25/4	10.5	5.6	8.0	11.1	5.6	8.3	7.1
2/5	14.9	7.1	11.3	15.3	6.9	11.3	10.2
9/5	12.9	8.7	10.7	12.9	8.6	10.7	10.1
16/5	14.5	9.3	11.9	14.7	9.2	11.9	10.5
23/5	14.9	10.5	12.7	15.1	10.1	12.7	12.2
30/5	15.5	11.1	13.4	16.1	10.8	13.4	11.6

Crop Observations

17 March Crop planted.
2 May First emergence.
16 May 90% emergence - estimated 5% ground cover.
2 June Meeting in rows - largest tubers 2-3 cm diameter.
2/3 July Crop harvested.

Between the planting date and crop emergence the East/West ridge had consistently higher maximum day-time temperatures (Table 1) by about 0.5°C and the largest differences occurred on the sunniest days (fig. 1). However, night-time minima were similar for both aspects so the nett benefit in the true daily mean temperature rarely exceeded 0.5°C on a given day, and 0.2°C on a weekly average. After crop emergence the shading effect of the foliage reduced these small differences.

Accumulated tuber temperature - above a base of 2°C, applicable to the rate of sprout development (MacKerron, 1984) - showed that the totals from 17 March to 10 May were 291°C days in the N/S ridge and 303°c days in the E/W ridge; a difference of 12°C days is equivalent to about 1 day at 14°C.

It should be noted that April 1986 was cloudy, cold and wet. Under these conditions large differences between different ridge directions would not be expected - following fig.1. The monthly total sunshine was 125 hours, (average = 141), the rainfall totalled 83 mm (average = 42 mm) and the mean air temperature was 5.5°C (average = 7.9°C).

Conclusions

During one of the coldest and wettest springs for many years soil temperature in East/West drilled potatoes were only marginally warmer than in North/South drills. The accumulated difference in soil temperature by the date of crop emergence was the equivalent of one day at 14°C. A small improvement on this would be expected in a more typical spring.

Any comments or suggestions should be referred to the author

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Key Words Potatoes; soil temperatures.

References MacKerron D.K.L. 1984. Potato sprout emergence in soil as a function of temperature and time from planting. E.A.P.R Triennial Conf.

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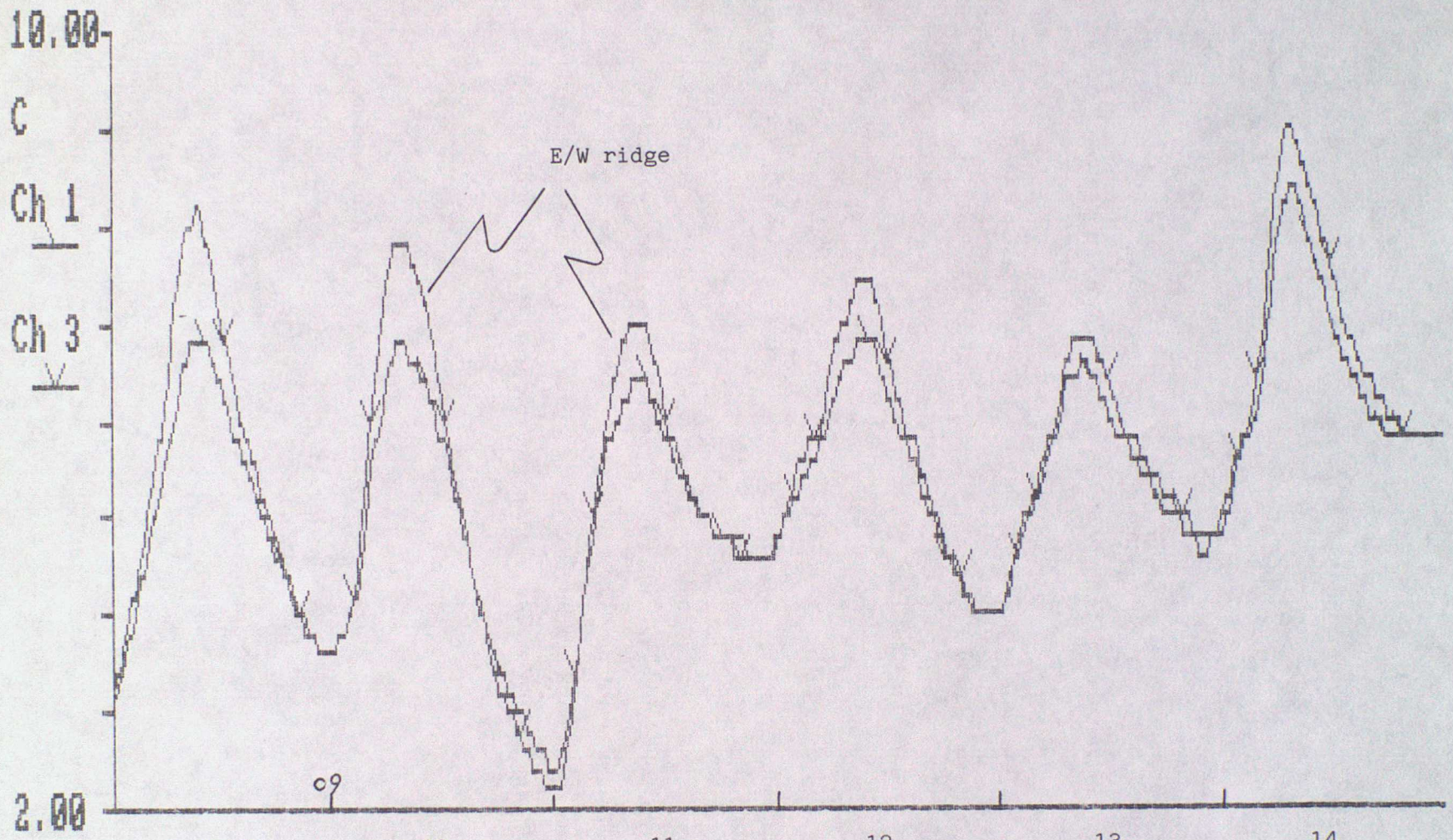
Fig. 1 Soil temperatures in N/S and E/W ridges.



Sunshine hours	7.4	7.3	3.8	1.7	0.0	2.7